



*REPORT OF THE
COMPTROLLER GENERAL
OF THE UNITED STATES*

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GENERAL ACCOUNTING OFFICE

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Benefits Claimed For
The Corps Of Engineers'
Catherine Creek Lake
Project In Oregon

Department of the Army

This report identifies issues concerning the project's economic feasibility which GAO believes should be addressed by the Corps if its planned restudy of the project is made.

The restudy is contingent on the resolution in the project's favor of a pending lawsuit by the Confederated Tribes of the Umatilla Indian Reservation which claims the project threatens their treaty rights to fishing in Catherine Creek.

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AUG. 31, 1976



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-185316

The Honorable Bob Packwood
United States Senate

Dear Senator Packwood:

Pursuant to your request of November 10, 1975, and subsequent discussions with your office, this report identifies issues concerning the economic feasibility of the Corps of Engineers' Catherine Creek Lake project in Oregon.

The contents of the report were discussed with Corps officials at the Walla Walla, Washington, district office and at the Washington, D.C., office. As you requested, we did not obtain written comments from the Corps or the Department of the Army.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, Senate and House Committees on Government Operations, Appropriations, and Public Works; and the Secretaries of Defense and Army.

SEN 03100

Sincerely yours,

ACTING

R. K. 17m
Comptroller General
of the United States

Enclosure

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ABBREVIATIONS

GAO	General Accounting Office
GDM	General Design Memorandum
NMFS	National Marine Fisheries Services
NPD	North Pacific Division
WRC	Water Resources Council

COMPTROLLER GENERAL'S
REPORT TO THE
HONORABLE BOB PACKWOOD
UNITED STATES SENATE

BENEFITS CLAIMED FOR THE
CORPS OF ENGINEERS'
CATHERINE CREEK LAKE
PROJECT IN OREGON

D I G E S T

The Corps of Engineers has not started construction on the Catherine Creek project because the Confederated Tribes of the Umatilla Indian Reservation have filed a lawsuit in which they claim the project would abrogate their 1855 treaty fishing rights in Catherine Creek. The Corps said that the lawsuit will probably not be settled for 2 to 3 years. (See pp. 3 and 4.)

Total project costs were estimated to be \$31 million in October 1975. The Corps estimated annual benefits and costs to be \$1,359,000 and \$1,277,000, respectively, resulting in a benefit-cost ratio of 1.06 to 1. Approximately \$1.5 million has been spent for planning since the project was authorized in 1965. (See pp. 1 and 7.)

GAO believes that consideration of additional information, most of which became available since the Corps' original benefit-cost determination, could reduce benefits as much as \$245,000 annually. This would result in a .87 to 1 benefit-cost ratio. A Corps restudy of the project probably would identify the need for other adjustments which could increase or decrease the benefit-cost ratio. (See pp. 7 and 8.)

GAO identified potential adjustments to anadromous fishery, recreation, irrigation, and municipal and industrial water supply benefits. These adjustments are primarily due to new data which was not available when the Corps made its 1971 study. (See pp. 4 and 7.)

--Anadromous fishery benefits (i.e., benefits derived from fish swimming upstream to spawn) could be reduced as much as \$149,000 annually because updated fishery research showed that, under optimum conditions, the number and size of salmon caught would be

less than estimated in 1971.
(See pp. 18 to 22.)

--Recreation benefits could be reduced by as much as \$127,000 annually. This reduction would primarily be due to using the latest State of Oregon estimates for (1) camper use, (2) length of recreation season, and (3) the general recreation need in the area. (See pp. 15 to 18.)

--Irrigation benefits could be increased by \$38,000 annually by applying updated price levels and the current irrigation discount rate. (See pp. 12 to 15.)

--Municipal and industrial water supply benefits of \$7,000 are questionable because water from the project does not meet state health standards without treatment. (See pp. 22 and 23.)

In addition, GAO found areas in each benefit category and in wildlife mitigation which should be restudied by the Corps. The major issues were in four benefit categories involving:

--flood control computations concerning (1) the project's ability to control floods and (2) the determination of the expected economic growth rate of crops and property over the project life. (See pp. 8 to 12.)

--analysis of farming practices in the project area to determine the impact of flood damage reductions on irrigation. (See pp. 12 to 15.)

--the need to reconcile differences in Corps and State estimates for present and future recreation needs in the project area. (See pp. 15 to 18.)

--estimates of juvenile salmon mortality rates resulting from fish passing through downstream dams. (See pp. 18 to 22.)

If the present litigation is resolved in the Corps' favor and the Corps then decides to proceed with the Catherine Creek Lake project, GAO recommends that the Secretary of the Army direct the Chief of Engineers to reexamine the economic feasibility of the project and recalculate the benefit-cost ratio in light of the issues discussed in this report. (See p. 24.)

The Corps generally agreed with GAO's conclusions but stated that GAO did not comprehensively evaluate possible reductions in project costs associated with benefit adjustments. GAO recognizes that a restudy of the project by the Corps may identify needed changes which could result in adjustments in project costs and benefits in addition to those identified in this report. (See p. 8.)

CHAPTER 1

INTRODUCTION

R At the request of Senator Bob Packwood, we reviewed benefits claimed for, and ascertained the status of, the Corps of Engineers' Catherine Creek Lake project. As agreed with the Senator's office we concentrated on major project benefit categories and did limited work on municipal and industrial water, road relocation, and area redevelopment benefits since the latter three categories either resulted in few benefits or were not considered for the project's economic justification.

PROJECT BENEFITS AND COSTS

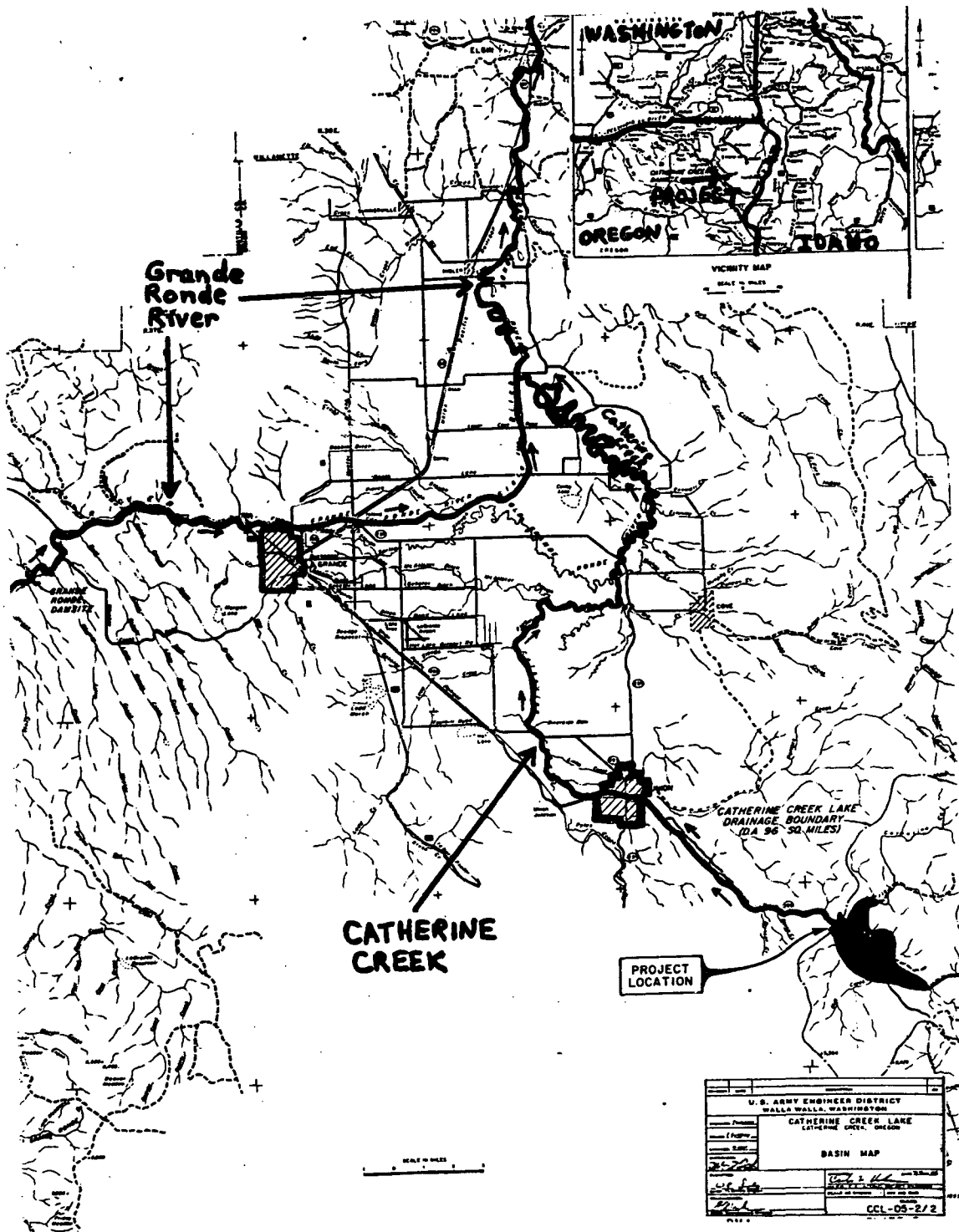
The Catherine Creek Lake project was authorized by the Flood Control Act of 1965 (Public Law 89-298). The project is planned for northeastern Oregon, about 8 miles upstream from the city of Union on Catherine Creek. (See map on p. 2.) The project's anticipated benefits--totaling about \$1.5 million annually--are for flood control, irrigation, recreation, anadromous fishery, lake fishery, municipal and industrial water supply, road relocation, and area redevelopment. (See p. 7.) As of October 1975 the Corps' Walla Walla District estimated that total project cost will be about \$31 million, with an annualized project cost of about \$1.28 million.

Most of the project's anticipated flood control benefits will accrue from partial control of spring snowmelt floods which cause agricultural damages along Catherine Creek from the city of Union to the confluence of Catherine Creek with the Grande Ronde River. Severe flooding results because the Grande Ronde Valley is a primeval lake bed which is virtually flat and slow draining.

Anticipated project irrigation benefits will result from supplying supplemental water to landowners who possess water rights. Most of these landowners are located north of Union near Catherine Creek.

Anticipated project recreation benefits are for increased visitor use of the existing Catherine Creek State Park which, with the dam, will double the 10 existing campsites and include a boat launching ramp and picnicking facilities along the lake. Also, in the 50th year after project construction, the Corps plans to add 100 new campsites along the lake.

Project lake fishery benefits are claimed for angling in the lake for trout. Project anadromous fishery benefits



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are claimed for making additional Chinook salmon available for sport and commercial fishing downstream from the project and in the ocean.

Project municipal and industrial water supply benefits are claimed for supplying water to Union as a result of regulating the flow of Catherine Creek.

Project benefits claimed for reduced highway maintenance costs are anticipated to result from building a road around the lake which will meet higher standards than the existing road it replaces. The district believes that fewer snow removal and maintenance costs would be incurred with the new road.

Project area redevelopment benefits are claimed for providing work opportunities for unemployed or underemployed workers during project construction.

PROJECT STATUS

A Corps district official stated that \$1,503,000 has been expended in studying the project from project authorization in 1965 through January 1, 1976. An additional \$30,000 was budgeted for the remainder of fiscal year 1976 to complete feature design work on the main dam.

The Confederated Tribes of the Umatilla Indian Reservation of Oregon 1/ have claimed rights under an 1855 treaty to fish Catherine Creek as a "usual and accustomed fishing location." By resolution, dated August 7, 1973, the Umatilla Tribe officially opposed the construction of a dam on Catherine Creek because the project would inundate some of their fishing locations. In a letter to the Corps dated December 27, 1973 the Secretary of the Interior stated:

"Nothing in the Act of October 27, 1965, or its legislative history, indicates a Congressional intent to take the Umatilla Tribes' property rights or authorize any office or agency of the Executive Branch to do so. We believe that legal precedent and fiduciary obligation require that taking of trust property should occur only when clearly authorized. Accordingly, absent tribal consent

1/ hereafter referred to as the Umatilla Tribe.

or specific legislation taking or authorizing the taking of the Umatilla Indian fishing and camping stations, we oppose the construction of the proposed Catherine Creek Dam and Reservoir project."

The Corps said it is continuing efforts to reach an agreement with the Umatilla Tribe by working through the Bureau of Indian Affairs. Since the Congress was apprised of the problem and still chose to fund the project in fiscal year 1975, the Corps took this as a mandate to start construction and notified the Umatilla Tribe and the Department of the Interior by letters dated November 5, 1974. The Umatilla Tribe responded by filing a complaint and motion for declaratory and injunctive relief in the Oregon Federal District Court on December 19, 1974. The Court has not acted, and the Corps has decided not to begin construction until the suit is settled which the Corps said may take 2 to 3 years. A district official told us that the Corps did not ask for fiscal year 1977 funding for the Catherine Creek Lake project and will not ask for funding unless the lawsuit is settled in the project's favor.

NEED FOR RESTUDY OF PROJECT

The Corps' district engineer told us that many of the project's benefits and costs are outdated because of new information and changed conditions since the General Design Memorandum (GDM) 1/ was completed in 1971. He said that if the pending lawsuit by the Umatilla Tribe is settled in favor of the project, the Corps plans to reevaluate project size and function and restudy the project's benefits and costs which would include responding to the issues raised by GAO in this report. Further, he said the Corps would hold a late stage public hearing to discuss project plans with interested citizens.

SCOPE OF REVIEW

We reviewed pertinent documents and interviewed officials at

- 1/ Specifies the basic project plan of development, extent of major features of development, estimated benefits and costs, operating requirements, real estate requirements, and the extent of local cooperation.

- the Corps' district office in Walla Walla, Washington;
- the Bureau of Reclamation regional office in Boise, Idaho;
- the National Marine Fisheries Service program office in Portland, Oregon;
- the Fish and Wildlife Service regional office in Portland, Oregon;
- the Bureau of Outdoor Recreation regional office in Seattle, Washington;
- Oregon State Fish and Wildlife Department in Portland and La Grande, Oregon;
- Oregon State Highway Division, Park and Recreation Branch in Salem and La Grande, Oregon; and
- the Corps' headquarters in Washington, D.C.

We also interviewed various local public officials and interested citizens in the La Grande and Union, Oregon, vicinity.

To evaluate the benefits claimed by the Corps, we examined benefits using the criteria, methods, and data from information sources currently in use by the agencies responsible for supplying benefit data. We then compared the updated information to the Corps' latest updated benefits--prepared in October 1975. We found many of the Corps' computations were prepared in 1971 and were subsequently updated for price level changes. Most of the procedures and data sources cited in this report were not available when the Corps prepared the 1971 study.

CHAPTER 2

EVALUATION OF PROJECT BENEFITS

The Corps has reported a 1.06 to 1 benefit-cost ratio for the project as of October 1975 based on a 100-year project life and a 3-1/4 percent discount rate. 1/ Add-on benefits 2/ for the project include area redevelopment and road relocation which raise the benefit-cost ratio to 1.17 to 1.

The project was authorized and the general design studies were prepared by the Corps using Senate Document 97 3/ as a guide. In September 1973 the Water Resources Council (WRC) published "Principles and Standards for Water and Related Land Resources" which replaced Senate Document 97. The Principles and Standards basically complement and expand on the benefit-cost evaluation concepts in Senate Document 97. The district engineer stated that if a restudy is made he would apply the concepts in the revised Principles and Standards. A Corps headquarters official stated that the district would be encouraged to use the Principles and Standards in the reanalysis, even though such use is not mandatory. We evaluated the benefits claimed by the Corps on the basis of the WRC criteria.

The following table shows the benefits computed by the Corps and the potential reduction in the benefits because of issues discussed later in this chapter. It also shows resulting effects on the benefit-cost ratio, assuming all other factors remain unchanged.

-
- 1/ In formulating water resources projects the values of benefits and costs that accrue at varying times are comparable only if all are adjusted to a uniform time basis. The use of discount rates provides a means for converting estimates of benefits and costs to a common time point or period.
 - 2/ Add-on benefits are benefits which, under Corps regulations, are not to be used to determine project economic justification. They may however, be added to an already justified project.
 - 3/ Senate Document 97, 87th Congress, second session, provides guidance in formulating, evaluating, and reviewing plans for using and developing water and related land resources.

Potential Adjustments to
Annual Benefits Reported by the Corps

	<u>Latest Corps estimate October 1975</u>	<u>Potential adjustments based on GAO findings (000 omitted)</u>	<u>Benefits after adjustments (note a)</u>
Annual costs	<u>\$1,277</u>		<u>\$1,277</u>
Annual benefits:			
Flood control	\$ 717	\$ -	\$ 717
Irrigation	200	38	238
Recreation	167	(127)	40
Anadromous fishery	203	(149)	54
Reservoir fishery	65	-	65
Municipal and Indus- trial water supply	<u>7</u>	<u>(7)</u>	<u>-</u>
Total used to justify project	\$1,359	\$ (245)	\$1,114
Benefit-cost ratio (note b)	1.06 to 1		0.87 to 1
Annual add-on benefits:			
Area redevelopment	123		
Road relocation	<u>13</u>		
Total annual benefits	<u>\$1,495</u>		
Benefit-cost ratio	1.17 to 1		

a/ Full credit is given to all benefits which are not adjusted even though substantial restudy is required. The restudy may justify benefit increases or decreases. In addition, changes in the annual cost estimate as a result of the restudy may result in increases or decreases in the benefit-cost ratio.

b/ This benefit-cost ratio is to be used to determine the economic justification for the project.

The above schedule shows only changes between the Corps' reported benefit figures and those which could result based on use of current criteria, procedures, and data. The .87 to 1 ratio is not what GAO concludes the new ratio to be, but is an indication that there are potential adjustments which could affect the Corps' current ratio. In addition to the adjustments shown in the above schedule we noted other issues which could increase or decrease net project benefits, as discussed in the following sections of this chapter.

Generally, the district engineer and his staff agreed with our adjustments. However, they stated that our study did not comprehensively evaluate the possible reduction in project costs associated with benefit adjustments. We recognize a restudy may also require project cost adjustments as well as adjustments in project benefits such as those discussed in this report.

FLOOD CONTROL BENEFITS

Flood control benefits of \$717,000 annually are claimed by the Corps for the Catherine Creek Lake project. Most of the benefits are for the protection of crops from spring flood damages below Union to the mouth of Catherine Creek. (See map on p. 2.) We did not include in the schedule on page 7 potential adjustments to these claimed flood control benefits because of the difficulty of quantifying such potential adjustments without a detailed study. However, we believe that the following matters, identified during our review, could affect the flood control benefits claimed by the Corps and should be restudied. These matters include the need for (1) an updated analysis of hydrologic conditions which contribute to floods and their control, (2) an analysis of the sensitivity of critical assumptions, such as the economic growth rate of crops and property and the contribution of the Grande Ronde River and tributaries to the project's capability to control floods, (3) an analysis of additional types of floods to fully account for the flood risk, and (4) a tabulation of the landowners benefiting from the flood control and irrigation benefits.

Update hydrologic conditions

There are three hydrologic conditions we believe the Corps should consider in its restudy: (1) flood control without the Corps' proposed Grande Ronde dam, Catherine Creek's

sister project, (2) reevaluation of smaller stream flows into Catherine Creek, and (3) reevaluation of the techniques used to determine flood flow frequencies.

Flood flow calculations were published in the 1971 GDM assuming that the Catherine Creek Lake project and the Grande Ronde project would work together to reduce flooding. The Corps told us, however, that the Grande Ronde project is not expected to be built within the near future. Therefore, Catherine Creek will be operating alone to control floods and we believe the hydrologic conditions should be reevaluated and updated on this basis.

A Corps district official told us that the reach between Union and the mouth of Catherine Creek contributes 91 percent of total flood control benefits claimed by the Corps. The Corps plans, in the restudy, to separate this reach into at least three subreaches. The Corps maintains that this will more precisely determine the effect of smaller stream contributions on the flow and the flooding of Catherine Creek below the proposed dam site. We agree that this procedure of isolating the Catherine Creek flood flows would provide a more accurate computation of flood control benefits.

WRC has adopted a uniform technique for evaluating the probability of flood flow frequencies. This technique has provisions for adapting a set of flow conditions to the specific characteristics of a river basin. This is termed a "skew coefficient" which is used in defining flood probabilities used to calculate flood control benefits. The district hydrologist told us that the skew coefficient used in the original analysis was the same as that used for other basins with topographical characteristics similar to those for the basin in which Catherine Creek is located. The district hydrologist stated that a study of the regionalized skew coefficient would be made, as recommended by WRC, if the project is restudied. However, he does not anticipate that it will differ by much from the skew coefficient that was used originally.

Sensitivity of assumptions made by the Corps

While determining flood control benefits the Corps made certain assumptions without making a detailed sensitivity analysis which might have revealed other appropriate assumptions. The assumptions made by the Corps concern (1)

establishing the anticipated growth rate in the value of flood damageable crops and related property over the life of the project, and (2) defining the project's ability to control flooding caused by the contribution of tributary streams and backwater from the Grande Ronde River.

WRC's Principles and Standards recommends that a sensitivity analysis be performed on "* * * key items for which alternative assumptions might be appropriate." Corps district officials told us that the sensitivity of the above two items was observed during the initial flood control benefit calculations, but that sensitivity studies were not required under Senate Document 97.

In determining the growth rate, the district used a projection of 1-3/4 percent for the first 50 years and 1-3/8 percent for the final 50 years of the 100-year project life. By varying the growth rate plus or minus 1/2 of 1 percent, the project's benefit-cost ratio 1/would vary from .97 to 1 up to 1.18 to 1.

In the reach from Union to the mouth of Catherine Creek, flooding is affected by the contribution of tributaries and a backwater effect from the Grande Ronde River. Since these contributions are below the Catherine Creek dam site they would not be controlled by the project. The district hydrologist recognized these influences in 1971 and reduced by 50 percent the benefits originally claimed for control of spring floods above the 8-year flood level and the benefits originally claimed for control of winter floods above the 90-year flood level. In response to our request, a district official evaluated various assumptions concerning the control of winter and spring floods with the result that the project benefit-cost ratio 1/ varied from .95 to 1 to 1.17 to 1. We found that the most critical areas to be evaluated are between the 4-year and 50-year spring flood level which represents 70 percent of the benefits for controlling spring floods and between the 20-year and 140-year winter flood level which accounts for 49 percent of the benefits for controlling winter floods.

1/ This assumes that all benefits claimed by the Corps are fairly stated and are not adjusted for any changes disclosed in this report.

A district official said they plan to evaluate the sensitivity of both the growth rate and flood probabilities when a formal restudy of project benefits and costs is initiated using WRC's Principles and Standards.

Additional types of floods

The latest flood control benefit calculations claim over 90 percent of the benefits for control of spring floods due to a combination of snowmelt and rainstorms, with the remaining benefits being claimed for partial control of winter rainstorms. The district does not claim flood control benefits for partial control of other types of floods caused by thunderstorms and spring rainstorms without snowmelts. In 1971 these floods were thought to be insignificant.

District officials stated that a restudy would include a reevaluation of the flooding potential and control capability of the above types of floods for which benefits are already claimed plus any benefits that may occur from the partial control of possible thunderstorm floods and spring-rainstorm floods. The district hydrologist believes that, because of its steep slope, the Catherine Creek Basin has a very high potential for severe floods which the project could partially control. To properly state project benefits, WRC's Principles and Standards requires that all relevant alternatives be factored into the analysis.

Few landowners would receive most of the benefits

Most of the land that will be enhanced due to flood control and irrigation measures (discussed on p. 12) is owned by a small number of individuals or corporations. It is the Corps' policy that when limited special interests receive windfall land enhancement benefits of an unconscionable magnitude, the situation should be included in the project report to the Congress.

The benefits for flood control and irrigation that will accrue to the lands along Catherine Creek are more than 67 percent of total project benefits or \$917,000 annually. While we did not attempt to identify all the land which would be enhanced due to flood control or irrigation benefits, there appears to be a concentration of land ownership in the lower Catherine Creek drainage area. We found that

17,221 acres near Catherine Creek are owned by 17 individuals and two corporations.

The 1948 flood, the largest flood ever recorded on Catherine Creek, inundated 14,000 acres. The irrigation project would provide supplemental irrigation water to 18,600 acres near Catherine Creek. GAO did not determine the amount of this acreage owned by the families and corporations mentioned above.

A 1965 Bureau of Reclamation map used by the Corps showed that for 17,000 acres which comprise the flood plain of a 35-year frequency flood, approximately 75 percent of the ownerships were 320 acres or less. A study conducted by district officials on land ownership concluded that there were no extremely large land holdings by a single owner. In reference to our land ownership findings, Corps district and headquarters officials stated that 17 individuals and two corporations do not constitute limited special interests and, therefore, no windfall land enhancement benefit situation exists. At present, WRC has not developed procedures to implement this standard.

We believe the Corps should consider the data presented above in any future project restudy and should disclose to the Congress the limited number of individuals and corporations benefiting from the project.

IRRIGATION BENEFITS

Irrigation benefits for the project were calculated by the Bureau of Reclamation. Benefits of \$200,000 annually are attributed to the project for projected increases in crop yields and net farm income that will result from supplemental irrigation water. When the Corps performs its restudy we believe more consideration should be given to (1) the probable effect on crops and yields of possible floods and droughts that cannot be prevented by the project, (2) the possibility of drilling wells and using groundwater as an alternative to surface flows for irrigation, (3) using all available data in computing irrigation benefits, and (4) updating to the most current normalized prices and interest rate.

Probable effects of floods and droughts on irrigation benefits

The Catherine Creek Lake project will not entirely eliminate the probability of droughts, winter floods, or extremely large spring floods, all of which could have great effect on irrigation benefits. This element of risk, according to WRC Principles and Standards, should have a value attached to it and be converted into a reasonably certain annual allowance to be applied to irrigation benefits.

Drought potential in the Catherine Creek Valley is illustrated by the fact that nine of the 44 years of stream records in the Corps Hydrology Design Memorandum were low-water years. We believe similar future drought conditions could affect yields and cropping practices, thus reducing the irrigation benefits. Corps district officials said this matter will have to be discussed with the Bureau of Reclamation.

The General Design Memorandum states that even with the dam there remains a potential for flood damages. The Corps' district claims that the project would maintain complete flood control for spring floods up to the 200-year flood, after which point control declines rapidly until it approaches the 1,000-year flood where all control is assumed lost. The district said that for winter floods, most flood waters originate downstream from the dam site and would not be controlled by the project. These floods could reduce yields by saturating the land, thus delaying or preventing spring planting. This could also encourage planting of lower value crops in the project area, thus reducing irrigation benefits. Bureau of Reclamation regional officials told us that there is no precedent for reducing irrigation benefits for these possible floods and droughts in the economic analysis and they cannot be certain that one would be initiated in the restudy of this project. The possibility of extremely large spring floods, winter floods, and droughts exists and we believe they should be considered when irrigation benefits are reexamined.

Groundwater as an alternative to project water

The Bureau of Reclamation's Region I prepared a report on the Grande Ronde project 1/ in May 1972. The "Water Supply and Requirements Appendix" and "Drainage Appendix" to this report indicate that, under ideal conditions, the potential recoverable supply of the Grande Ronde Valley 2/ groundwater is estimated not to exceed 100,000 acre-feet annually.

The project is expected to retain up to 43,250 acre-feet of joint flood control and irrigation water storage which would yield an average of 23,300 acre-feet of water annually for irrigation use.

The Principles and Standards states that all alternatives must be examined so that the most effective plan will be selected. The Bureau's Region I study and State of Oregon study indicate that the development of the well and groundwater alternative for irrigation will help lessen the drainage problem and lower the water table creating additional groundwater storage space for irrigation and flood control purposes. The use of groundwater for irrigation is a possible alternative to the use of surface flows based on the Bureau's report and the number of wells in the area. We believe this potential should be examined in greater detail when the project is reanalyzed.

Consideration of all available data

In the Bureau of Reclamation's 1972 Grande Ronde project study, Bureau officials based their irrigation benefits on a livestock enterprise for the project area. However, Corps district officials assumed a farming operation in calculating flood control benefits. Corps and Bureau officials stated that they did not consult each other on the livelihood of the people in the area. These officials said that they conducted studies in the project area, which resulted in their findings, but the difference in conclusions is a result of looking at land in separate areas of the Valley. The

1/ The Bureau's Grande Ronde project proposed an irrigation system for the Grande Ronde and Catherine Creek Valleys.

2/ Refers to project area with approximate boundaries of Union, La Grande, Cove, and Imbler, Oregon.

Corps concentrated on land closer to the river and the Bureau surveyed land that would receive irrigation water which is generally located away from Catherine Creek.

Corps district officials now recognize that livestock operations in the area may be significant and will consider this aspect in their restudy.

The Principles and Standards states that the " * * * responsible planning organization will consult appropriate Federal, regional, State, and local groups to ascertain the components of the objectives that are significantly related to the use and management of the resources in the planning setting." In the reanalysis of this project, District and Bureau officials should discuss and exchange relevant information which may pertain to each others' benefit investigations, and reach agreement on the use of common assumptions.

Updating prices and the irrigation discount rate

When the Bureau's Region I officials calculated irrigation benefits in 1972, they used an irrigation discount rate of 5-1/2 percent and current normalized prices for the 1960-1964 period for farm goods and the 1965-1969 period for livestock, all of which were appropriate at the time.

We were told by Bureau officials that the irrigation discount rate differs from the project discount rate of 3-1/4 percent because the Bureau originally planned to include federally funded features which had not been authorized by the Congress. In such cases, Bureau policy requires that unauthorized project segments be evaluated at a current interest rate. Bureau officials stated that since the drainage facilities to be built by the district were not authorized by the Congress they should be evaluated using the current interest rate. If the current discount rate of 6-1/8 percent and 1974 current normalized prices are applied, irrigation benefits would total \$238,000 annually, an increase of \$38,000.

RECREATION BENEFITS

Recreation benefits of \$167,000 annually were computed by the Corps district for additional recreation use at the present Catherine Creek State Park and for future facilities to be developed along the lake. We believe that a restudy

of the recreation benefits should give consideration to (1) the State of Oregon's most current recreational demand estimates for the project area, (2) an evaluation of the future recreation usage expected at Catherine Creek State Park without the project, and (3) the use of the appropriate recreation visitor day value at the project. Recreation benefits might be reduced as much as \$127,000 annually if consideration were given to these three matters.

Coordinate with the State of
Oregon in future recreational
needs

The Principles and Standards states that the responsible planning organization will consult appropriate Federal, regional, State, and local groups to carefully relate the planning of water and land resources to regional or local planning activities.

During preparation of the 1971 GDM, the Corps district consulted Federal, State, and local agencies regarding the scope of development for the recreation facilities at the Catherine Creek Lake project. Since this GDM, the State of Oregon Parks and Recreation Branch has gathered current information and revised demand projections for the project.

A State study entitled "Supplements and Revisions to Oregon Outdoor Recreation," published in October 1972, projects a shortage of 1,259 stream miles of recreation and an oversupply of 8,272 lake acres of recreation in north-eastern Oregon by 1990. Oregon recreation officials stated that this study indicated that the proposed recreation facilities at the project will have a low priority and are not consistent with the long range regional recreation needs as identified in the State of Oregon's comprehensive recreation plan.

The more recent information from the State of Oregon on future recreation needs for the project has resulted in differing views on recreation use. These differences between the State and the district are as follows:

<u>Description of recreation factor</u>	<u>Corps of Engineers (1971)</u>	<u>State of Oregon (1972)</u>
Length of the recreation season	120 days	100 days
Campsite occupancy rate for:		
Initial project development (20 campsites)	80 percent	70 percent
Future project development	100 percent	70 percent
Number of additional campsites needed	100	50

The district recreation planner stated that the 120-day anticipated length of the recreation season is justified because of the hunting activity which occurs in the fall near Catherine Creek. A State Parks and Recreation official familiar with the project stated that fall hunters probably would not use the State park because hunters prefer the abundant nonfee National Forest lands for camping. He also stated that hunting is prohibited in the State park.

A district official stated that the 80 percent occupancy rate for the initial 20-unit campground was based on statistics from a similar project, a campground having 58 units and an average occupancy rate of 63 percent. It was assumed that the smaller number of facilities at Catherine Creek would have a higher occupancy rate, yet the district assigned a 100 percent occupancy rate to the 100 future campsites. The district recreation planner stated that he based this occupancy rate on visitor use data at other Corps projects in the Walla Walla District. This appears to be in conflict with the district's rationale for the initial campsite occupancy rate. We believe the district and the State should reconcile their different viewpoints in a subsequent project restudy.

If the State's recreation assumptions were used, recreation benefits would be reduced by \$92,000 annually.

Evaluate future recreational usage of park without project

Since the district's project development area currently includes day use facilities and 10 campsites at Catherine Creek State Park, the recreation benefits attributable to the project should exclude future recreational usage of these day use and camping sites to properly evaluate the without-project condition.

According to the Principles and Standards, both beneficial and adverse effects of a proposed plan should be measured by comparing the estimated conditions with the plan to the conditions expected without the plan. The district's recreation benefit computations, however, did not subtract the estimated future attendance for the State park. Applying the Corps' procedures, if \$.50 per general recreation visitor day and a \$1.00 per camper night were used to evaluate the park without the project, recreation benefits would be reduced by \$23,000 annually.

Use of the appropriate value for a recreation visitor day

Procedures established by the Corps' North Pacific Division (NPD) require the district to use a rating chart for determining project recreation user day values. The rating chart is prepared by NPD. The district assigns numeric values to subjective criteria, arriving at a dollar value for a recreation day.

The recreation day value assigned to the Catherine Creek Lake project, based upon criteria in the NPD rating chart, is \$1.25. Corps district officials told us that the district mistakenly used a \$1.50 visitor day value to compute recreation benefits. By applying the \$1.25 unit value from the NPD rating chart, annual project recreation benefits would be reduced by \$12,000.

FISHERY BENEFITS

Project fishery benefits of \$268,000 include \$203,000 for commercial and sport harvesting of anadromous fish downstream from the project and \$65,000 for sport angling in the project lake. For the computation of fishery benefits the Corps district relied on data provided by the National Marine Fisheries Service (NMFS), Department of Commerce; the U.S. Fish and Wildlife Service, Department of the Interior; and the Oregon State Department of Fish and Wildlife.

Officials from the State and NMFS stated that they requested the Corps give them an opportunity to update the fishery parameters based on new and improved information when the Corps restudies the project.

Because of the changes which have taken place since the GDM was prepared in 1971, the officials from the fishery agencies stated that the following subjects should be evaluated in a project restudy: (1) the number, size, and the

value of anadromous fish harvested, (2) the risk of downstream juvenile fish mortality due to nitrogen supersaturation and to generator turbine intake kill, and (3) the compatibility of rearing both juvenile salmon and trout in the project lake. Using the most current fishery harvest data provided by NMFS and the Corps' specialized recreation day value, anadromous fishery benefits could be reduced by as much as \$149,000, to a total of \$54,000 1/ in annual benefits.

Anadromous fish harvest and valuation

Since the GDM was formulated in 1971, NMFS has gathered data which shows that the number of Spring Chinook salmon caught by sport and commercial fishermen downstream from the project and in the ocean should be reduced. This adjustment would reduce the estimated number of salmon caught annually by sport and commercial fishermen to 1,173 and 1,377, respectively.

NMFS also determined that the current average weight of Spring Chinook salmon caught by commercial fishermen is 14 pounds rather than the 17 pound figure furnished to the district in 1971. This reduction in the average weight and the number of fish caught would reduce the total number of pounds of fish caught commercially from the 84,000 pounds recorded by the Corps to 19,278 pounds as defined by NMFS.

The Principles and Standards allows an agency to select the appropriate recreation user day value. For specialized recreation, such as sport salmon angling, the Principles and Standards allows an agency to select a value from \$3 to \$9 per day. If an agency departs from this range it must submit a full explanation.

The district used the \$6 per angler day value which was the maximum permitted by Senate Document 97 in 1971. Subsequently, NMFS cited a study from the Washington Department of Fisheries entitled "Economic Evaluation of the 1967 Sport Salmon Fisheries of Washington" dated April 1970, which supports a \$28 per angler day value. NMFS officials stated that the \$28 per day value is reasonable and should be used

1/ This value was computed using the \$6 per angler day value used by the district in the 1971 GDM.

in a restudy. District officials stated that, although they had not reviewed the study cited by NMFS, they believed the \$28 per day value appeared to be an excessive departure from the Principles and Standards and probably would not be used in a reanalysis without a thorough review.

The following table displays the effect on anadromous fishery benefits after applying the various specialized recreation day values discussed above to the latest updated values available.

Changes in Anadromous Fishery
Benefits with Different Angler Day Values

<u>Basis for using angler day value</u>	<u>Specialized recreation day value</u>	<u>Total anadromous sport and commercial fishery benefits</u>
Computed by Corps in 1974 using Senate Document 97	\$ 6	a/\$203,000 annually
Research supported by NMFS and using current NMFS fishery data	28	183,000 annually
Upper limit of Principles and Standards not requiring full explanation using current NMFS commercial fishery data	9	72,000 annually
Upper limit of Senate Document 97 not requiring full explan- ation using current NMFS fishery data	6	54,000 annually

a/ Latest estimate submitted to the Congress by the district.

Risk of downstream juvenile
fish mortality

NMFS officials stated that their anadromous fishery benefit calculations are based on the assumption that juvenile salmon will migrate safely through the Snake and Columbia River dams. A recent study by NMFS has shown that dams constructed on the two rivers have increased the anadromous fish mortality as a result of juveniles passing through the turbines and from increased nitrogen supersaturation in the river.

The Corps recognized these problems and proposed the construction of spillway deflectors to reduce nitrogen supersaturation plus traveling turbine intake screens to reduce the number of fish entering the turbines, thus minimizing the anadromous fish kill.

By July 1976 the Corps had installed 50 of the 93 proposed spillway deflectors and 13 of the proposed 282 traveling screens on the eight dams downstream from the project. The tentative schedule for the completion of these facilities is fiscal year 1983. Although these devices should help reduce fish mortality, they are not expected to be fully effective. For example, certain design features of the deflectors and screens have limited their effectiveness in minimizing juvenile fish loss.

--According to NMFS officials, spillway deflectors, when submerged due to flood flows, are substantially less effective in deflecting the water and reducing nitrogen supersaturation.

--According to a Corps official, traveling screens prevent about 70 percent of the fish loss because present designs only cover one-third of a turbine intake opening. The official stated that to install a screen covering the entire turbine intake opening would be very costly and difficult to maintain.

At the time of the 1971 GDM, NMFS officials stated that they were optimistic that the Corps' facilities would fully prevent juvenile salmon kill by the Snake and Columbia River dams. However, these officials stated that if a restudy were conducted they would try to estimate the success of the new fish protection facilities.

An ongoing study by NMFS has shown that the survival rate can be increased by transporting the juvenile salmon collected at a Snake River dam to the water below Bonneville Dam, thereby avoiding the turbines and the nitrogen supersaturation.

A Corps official stated that this method has not been adopted as the long term solution because there is not sufficient research available at this time to justify the transportation of all salmon below Bonneville Dam. He stated that this program could cause mature salmon to lose their instinct to migrate upstream.

We believe this issue should be reviewed using the latest information available when the district initiates its project restudy.

Feasibility of raising juvenile salmon and resident trout in the reservoir

The GDM indicates that 1.25 million juvenile Chinook salmon will be raised in the project lake for the anadromous sport and commercial fishery together with an unspecified number of trout for reservoir fishing. The success of this program will affect three benefit categories: anadromous fishery, \$203,000; resident (reservoir) trout fishery, \$65,000; and recreation, \$167,000. The possible effects which may detract from the project benefits are (1) the salmon and trout may compete for available food supply and reduce the number of each species available for fishery benefits and (2) if the trout survival rate is low, fishing will be poor and the recreation attendance and resident sport angler days could be decreased.

Oregon State parks' officials have stated that the fulfillment of the project's anticipated recreation attendance will be tied closely to a successful resident trout fishery. NMFS officials stated that rearing of salmon in the proposed reservoir could enhance the resident trout fishery by providing the anglers with catchable fingerling salmon in addition to the trout.

Although there has been success in the reservoir rearing of both salmon and resident trout in western Oregon, there are no formal studies evaluating the compatibility of rearing the two species in eastern Oregon reservoirs where the climate is different.

Officials from the Oregon Department of Fish and Wildlife stated that they believe that the present fishery plan is feasible but would like to reevaluate the planned stocking rates for the proposed reservoir if the Corps initiates a project restudy.

MUNICIPAL AND INDUSTRIAL WATER ISSUE

Municipal and industrial water supply benefits of \$7,000 annually are questionable because use of Catherine Creek Lake project water for this purpose may not be feasible. According to the "Water System Review," a study performed by an engineering consulting firm, the present Catherine Creek

water supply to Union does not meet minimum Oregon State Health Department standards. The study also showed that the city of Union uses more water than the average Oregon city, especially in the summer. One reason given for higher summer-time use is the large demand for residential irrigation water.

The study concluded that the most economical source of water for Union is from groundwater by drilling wells and that the water quality of the one existing city well (not yet connected) meets State health standards without treatment. In contrast, water supplied by the project would have to be treated. A cost comparison presented in the study showed that a plant to treat Catherine Creek water will cost about twice as much as drilling for groundwater.

The Principles and Standards states that "a range of possible alternatives to meet needs and problems, including types of measures and alternatives capable of application by various levels of government and by non-governmental interests, should be studied." Because of the present need for a solution to Union's water crisis, the potential of the groundwater development alternative and the length of time until the completion of the Catherine Creek Lake project, we believe that continued justification for municipal and industrial water supply benefits should be carefully examined before they are included in total benefits when the project is restudied.

A Corps district official told us that if the restudy shows that there is an alternative to project water which costs the city less, then it would not be proper to claim municipal and industrial water supply benefits. However, he said benefits may accrue through the sale of project water to Union for residential irrigation purposes.

WILDLIFE MITIGATION

New procedures recently developed improve the accuracy in evaluating the fish and wildlife losses due to the adverse effects of water resource projects on fish and wildlife habitat. We believe these new procedures should be used during the project restudy.

The district's 1971 GDM states that the Catherine Creek Lake project will inundate 800 acres of land and will markedly influence environmental conditions on another estimated 1,000 acres of land immediately surrounding the lake shoreline. Since the project will cause a displacement of big game animals around the project area, fish and wildlife

agencies recommended mitigation measures in 1971 of 480 acres to be fenced and managed as a big game range at an estimated \$96,000 which has been added to project costs.

New evaluation procedures for fish and wildlife resources have been developed by a committee organized by the U.S. Fish and Wildlife Service to fully evaluate lost flora and fauna and to assess adequate mitigation of wildlife habitat lost due to water resource projects. Although preliminary, the methods published in the report "Ecological Planning and Evaluation Procedures" dated January 1974, were designed to implement the Principles and Standards by recognizing the equal status of both the National Economic Development and Environmental Quality objectives.

Officials from the Oregon Department of Fish and Wildlife stated that the new methods are superior to past techniques for evaluating wildlife habitat losses and they would like an opportunity to have the project reevaluated using the new procedures when the district resumes its restudy efforts.

Corps district officials told us that they have not reviewed the new U.S. Fish and Wildlife Service procedures but would consider them in the project restudy.

CONCLUSIONS

The benefit-cost analysis supporting the economic feasibility of a proposed project is an important factor in the congressional and agency decisionmaking process. We believe that the issues identified in this report could have an impact on the economic feasibility of the Catherine Creek Lake project. These issues, along with others the Corps identifies, should be examined in any restudy of the project benefit-cost ratio.

RECOMMENDATION TO THE SECRETARY OF THE ARMY

If the present litigation is resolved in the Corps' favor and the Corps then decides to proceed with the Catherine Creek Lake project, we recommend that the Secretary of the Army direct the Chief of Engineers to reexamine the economic feasibility of the project and recalculate the benefit-cost ratio in light of the issues discussed in this report.